SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

2102-F-21-R-43

Name: East 81 Lake **County**: Brookings
Legal Description: T109N-R52W-Sec. 7, 18
Location from nearest town: 4 miles south of Arlington, SD

Dates of present survey: August 16-18, 2010
Date last surveyed: August 18-20, 2008

Managed Species	Other Species
Yellow Perch	Northern Pike
Walleye	White Bass
Black Bullhead	White Sucker
	Yellow Bullhead

PHYSICAL DATA

Surface area: 484 acres
Maximum depth: Unknown
Volume: Unknown
Contour map available: Yes
OHWM elevation: None set
Outlet elevation: Note set
Watershed: No data available
Mean depth: Unknown
Shoreline length: Unknown
Date mapped: 2002 (SDSU)
Date set: NA
Date set: NA
Lake elevation observed during the survey: One foot low

Ownership of Lake and Adjacent Lakeshore Property

East 81 Lake is not listed as a meandered lake in the State of South Dakota Listing of Meandered Lakes, but the South Dakota Department of Game, Fish, and Parks (GFP) manages the fishery. Most of the shoreline lies within a Waterfowl Production Area (WPA) managed by the United States Fish and Wildlife Service (USFWS). The remainder of the shoreline is privately owned.

Fishing Access

There is no boat ramp or other facilities on East 81 Lake. Small boats can be launched off a sandy shoreline on the northwest corner of the lake but parking is limited. There is some shore fishing access within the WPA on the north shore and from the road right of way.

Field Observations of Water Quality and Aquatic Vegetation

The water in East 81 Lake was fairly clear with a Secchi depth measurement of 56 cm (22 in). Some floating algae was observed and there were dense beds of sago pondweed (*Potamageton pectinatus*), northern water milfoil (*Myriophyllum exalbescens*) and clasping leaf pondweed (*Potamageton richardsonii*) around the entire lake.

BIOLOGICAL DATA

Methods:

East 81 Lake was sampled on August 16-18, 2010 with two overnight gill net sets and nine overnight trap net sets. The trap nets are constructed with 19-mm-bar-mesh (¾ in) netting, 0.9 m high x 1.5 m wide (3 ft high x 5 ft wide) frames and 18.3 m (60 ft) long leads. The gill nets are 45.7 m long x 1.8 m deep (150 ft long x 6 ft deep) with one 7.6 m (25 ft) panel each of 13, 19, 25, 32, 38 and 51-mm-bar-mesh (½, ¾, 1, 1¼, 1½, and 2 in) monofilament netting.

Results and Discussion:

Gill-Net Catch

Yellow perch comprised 57.1% of the gill net sample followed by walleye (26.6%), white bass (13.6%) and black bullhead (2.7%) (Table 1). No other species were sampled.

Table 1. Total catch from two overnight gill net sets at East 81 Lake, Brookings County, August 16-18, 2010.

Species	Number	Percent	CPUE[1]	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Yellow Perch	172	57.1	86.0	±59.0	80.2	41	0	101
Walleye	80	26.6	40.0	±7.7	13.3	23	5	97
White Bass	41	13.6	20.5	±16.0	4.4	--	--	--
Black Bullhead	8	2.7	4.0	±3.8	50.2	--	--	--

* Five years (2000, 2002, 2004, 2006, 2008).

Table 2. Catch per unit effort by length category for various fish species captured with gill nets in East 81 Lake August 16-18, 2010.

Species	Substock	Stock	S-Q	Q-P	P+	All sizes	80% C.I.
Yellow Perch	8.0	78.0	46.0	32.0	--	86.0	±59.0
Walleye	0.5	39.5	30.5	7.0	2.0	40.0	±7.7
White Bass	19.5	1.0	1.0	--	--	20.5	±16.0
Black Bullhead	--	4.0	3.0	1.0	--	4.0	±3.8

Length categories can be found in Appendix A.

[1] See Appendix A for definitions of CPUE, PSD, and mean Wr.

Trap-Net Catch

White bass was the most common species sampled in trap nets (72.5%) followed by yellow bullhead, black bullhead, green sunfish, yellow perch, walleye, black crappie, northern pike, and white sucker(Table 2).

Table 3. Total catch from nine overnight trap net sets at East 81 Lake, Brookings County, August 16-18, 2010.

Species	No.	Percent	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
White Bass	689	72.5	68.9	±66.6	0.4	0	0	99
Yellow Bullhead	125	13.2	12.5	±6.8	38.7	100	94	110
Black Bullhead	47	4.9	4.7	±1.9	611.5	53	7	101
Green Sunfish	37	3.9	3.7	±4.0	0.0	3	0	97
Yellow Perch	24	2.5	2.4	±2.0	5.8	67	4	93
Walleye	15	1.6	1.5	±0.9	0.9	87	33	96
Black Crappie	9	0.9	0.9	±1.0	0.0	--	--	--
Northern Pike	3	0.3	0.3	±0.2	0.7	--	--	--
White Sucker	1	0.1	0.1	±0.1	0.1	--	--	--

* Five years (2000, 2002, 2004, 2006, 2008).

Table 4. Catch per unit effort by length category for various fish species captured with trap nets in East 81 Lake August 16-18, 2010.

Species	Substock	Stock	S-Q	Q-P	P+	All sizes	80% C.I.
White Bass	55.8	13.0	13.0	--	--	68.9	±66.6
Yellow Bullhead	--	12.5	--	0.8	6.3	12.5	±6.8
Black Bullhead	0.2	4.5	2.1	2.1	0.3	4.7	±1.9
Green Sunfish	--	3.7	3.6	0.1	--	3.7	±4.0
Yellow Perch	--	2.4	0.8	1.5	0.1	2.4	±2.0
Walleye	--	1.5	0.2	0.8	0.5	1.5	±0.9
Black Crappie	--	0.9	0.9	--	--	0.9	±1.0
Northern Pike	0.1	0.2	--	0.2	--	0.3	±0.2
White Sucker	--	0.1	--	--	0.1	0.1	±0.1

Length categories can be found in Appendix A.

Walleye

Management objective: To maintain a walleye population with a gill-net CPUE of at least 15, 25 cm (10 in) or longer fish in three out of five lake surveys.

The walleye management objective in East 81 Lake is currently being achieved. Gill-net CPUE increased this year because a strong year class was naturally produced in 2009 (Table 5 and 6, Figure 1). East 81 walleyes grow fast and are in excellent condition. All year classes from 2005 through 2009 were present in this year's sample (Table 6). This suggests consistent natural reproduction since no walleyes have been stocked since 2006 (Table 9).

Table 5. Walleye gill-net CPUE, PSD, RSD-P, and mean Wr for East 81 Lake, Brookings County, 2002-2010.

	2002	2003	2004	2005	2006	2007	2008	2009	2010	Mean*
CPUE	2.3		4.0		35.3		22.0		40.0	13.3
PSD	--		--		5		65		23	35
RSD-P	--		--		0		0		5	0
Mean Wr	--		--		87		96		97	92

* Five years (2000, 2002, 2004, 2006, 2008).

Table 6. Weighted mean length at capture (mm) for walleye captured in gill nets in East 81 Lake, Brookings County, 2010. Sample size is in parentheses.

Year	1	2	3	4	5	6	7	8	9	10	11	12
2010 (79)	329 (61)	436 (3)	476 (10)	474 (1)	541 (3)	--	550 (1)	--	--	--	--	--

Yellow Perch

Management objective: To maintain a yellow perch population with a gill-net CPUE of at least 25, 13 cm (5 in) or longer fish in three out of five lake surveys.

In 2009, 319,000 hatchery-produced yellow perch fingerlings marked with oxytetracycline (OTC) were stocked in East 81 for the first time (Table 8). Later in 2009, 98% of all age-0 perch sampled had OTC marks suggesting that the stocking may have produced a catch of 68 yearlings per gill-net set in 2010. Based on this analysis, we are confident the 2009 stocking made a significant contribution to the East 81 yellow perch population.

Table 7. Yellow perch gill-net CPUE, PSD, RSD-P, and mean Wr for East 81 Lake, Brookings County, 2002-2010.

	2002	2003	2004	2005	2006	2007	2008	2009	2010	Mean*
CPUE	244.0		57.5		14.3		17.7		86.0	80.2
PSD	46		46		84		42		41	54
RSD-P	19		20		30		2		0	19
Mean Wr	105		100		116		111		101	105

* Five years (2000, 2002, 2004, 2006, 2008).

Table 8. Weighted mean length at capture (mm) for yellow perch captured in gill nets in East 81 Lake, Brookings County, 2010. Sample size is in parentheses.

Year	1	2	3	4	5	6	7	8
2010 (156)	191 (135)	218 (21)	--	--	--	--	--	--

Black Bullhead

Management objective: Maintain a black bullhead population with a trap-net net CPUE of no more than 100.

Black bullhead trap-net CPUE decreased significantly this year (Table 5). The population consists of larger fish with an average length of 231 mm (9.1 in) (Figure 3). Black bullhead CPUE was much higher in 2000 and 2002 when walleye CPUE was low suggesting some predatory influence on the population.

Yellow bullheads were more numerous (CPUE = 12.5) and larger than black bullheads having a mean length of 331 mm (13.0 in).

Table 7. Black bullhead trap net CPUE, PSD, RSD-P, and mean Wr for East 81 Lake, Brookings County, 2002-2010.

	2002	2003	2004	2005	2006	2007	2008	2009	2010	Mean*
CPUE	2,270.8		7.9		57.8		81.2		4.7	611.5
PSD	12		70		26		5		53	28
RSD-P	0		19		2		1		7	6
Mean Wr	97		87		80		96		101	90

* Five years (2000, 2002, 2004, 2006, 2008).

All Species

Green sunfish and black crappie were caught for the first time in this year's survey. White bass and walleye CPUE was the highest recorded (Table 8). CPUE for other species was within previous ranges. Several muskellunge were caught during the spring walleye spawning operation.

Table 8. Gill-net (GN) and trap-net (TN) CPUE for all fish species sampled in East 81 Lake, Brookings County, 2002-2010.

Species	2002	2003	2004	2005	2006	2007	2008	2009	2010
WHS (GN)	0.7		--		0.3		0.3		--
WHS (TN)	--		--		0.3		--		0.1
BLB (GN)	73.7		1.0		--		8.0		4.0
BLB (TN)	2,270.8		7.9		57.8		81.2		4.7
YEB (GN)	--		6.5		1.0		1.7		--
YEB (TN)	--		179.7		6.9		6.8		12.5
NOP (GN)	2.7		0.5		0.3		0.3		--
NOP (TN)	0.7		1.6		0.1		--		0.3
WHB (GN)	0.7		5.0		3.0		13.3		20.5
WHB (TN)	0.3		0.1		--		1.4		68.9
GSF (GN)	--		--		--		--		--
GSF (TN)	--		--		--		--		3.7
BLC (GN)	--		--		--		--		--
BLC (TN)	--		--		--		--		0.9
YEP (GN)	244.0		57.5		14.3		17.7		86.0
YEP (TN)	4.2		0.1		--		0.4		2.4
WAE (GN)	2.3		4.0		35.3		22.0		40.0
WAE (TN)	0.2		0.7		2.3		1.3		1.5

WHS (White Sucker), BLB (Black Bullhead), YEB (Yellow Bullhead), NOP (Northern Pike), WHB (White Bass), YEP (Yellow Perch), WAE (Walleye)

MANAGEMENT RECOMMENDATIONS

1. Stock walleye fry or fingerlings as needed to accomplish the management objective.

2. Stock yellow perch fry, fingerlings or adults as needed to accomplish the management objective.

3. Accomplish the black bullhead management objective by maintaining high walleye abundance.

4. Monitor the East 81 fishery by continuing to conduct lake surveys every other year.

5. Explore opportunities to develop boat and shore fishing access.

6. Complete a contour map of the lake. Determine which waters are connected and include connected waters in management activities.

Table 9. Stocking record for East 81 Lake, Brookings County, 2003-2010.

Year	Number	Species	Size
2003	440,000	Walleye	Fry
	44,820	Walleye	Fingerlings
2005	50,000	Walleye	Fingerlings
2006	49,170	Walleye	Fingerlings
2009	319,000	Yellow Perch	Fingerlings

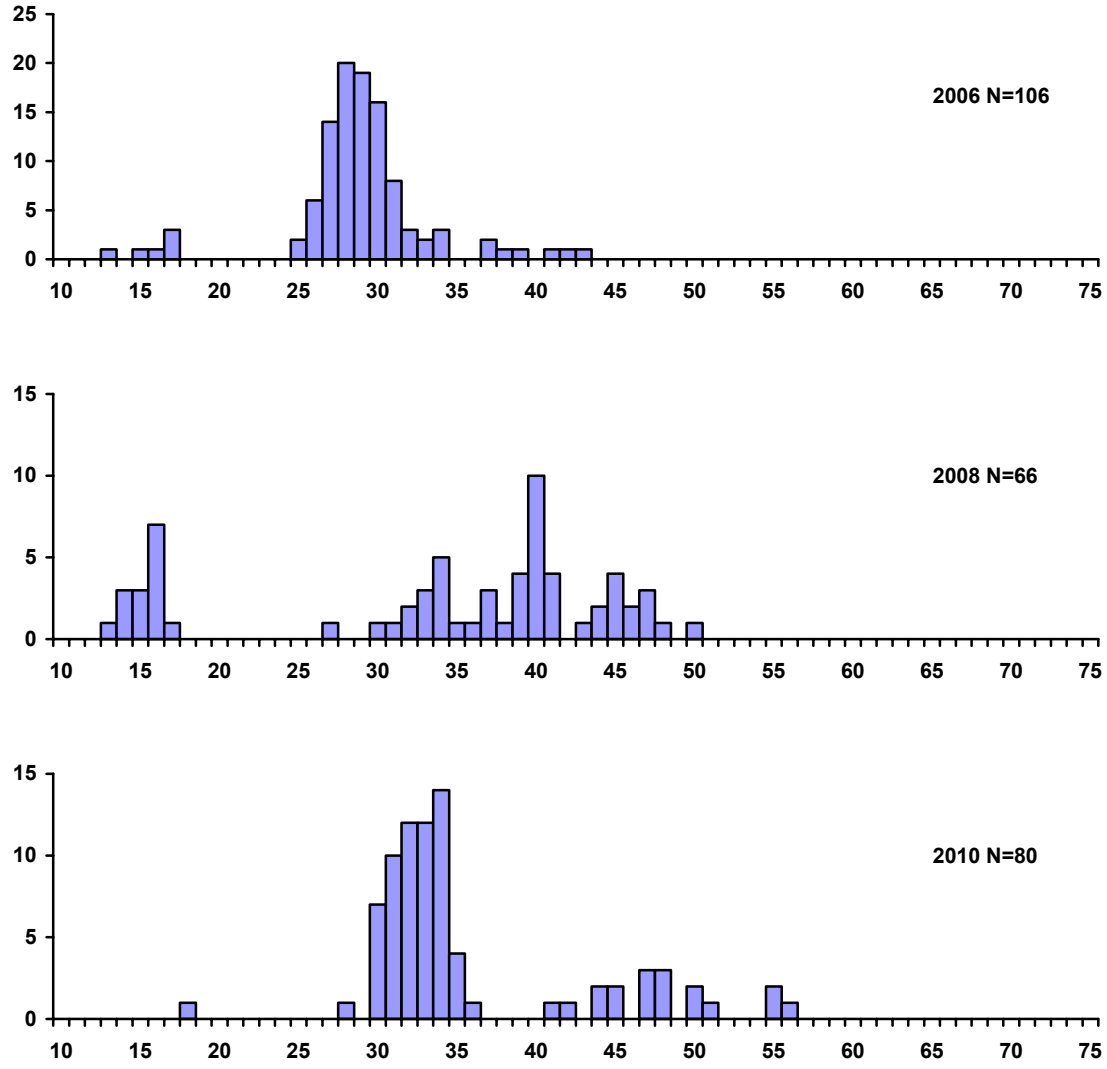

Figure1. Length frequency histograms for walleye sampled with gill nets in East 81 Lake, Brookings County, 2006, 2008, 2010.

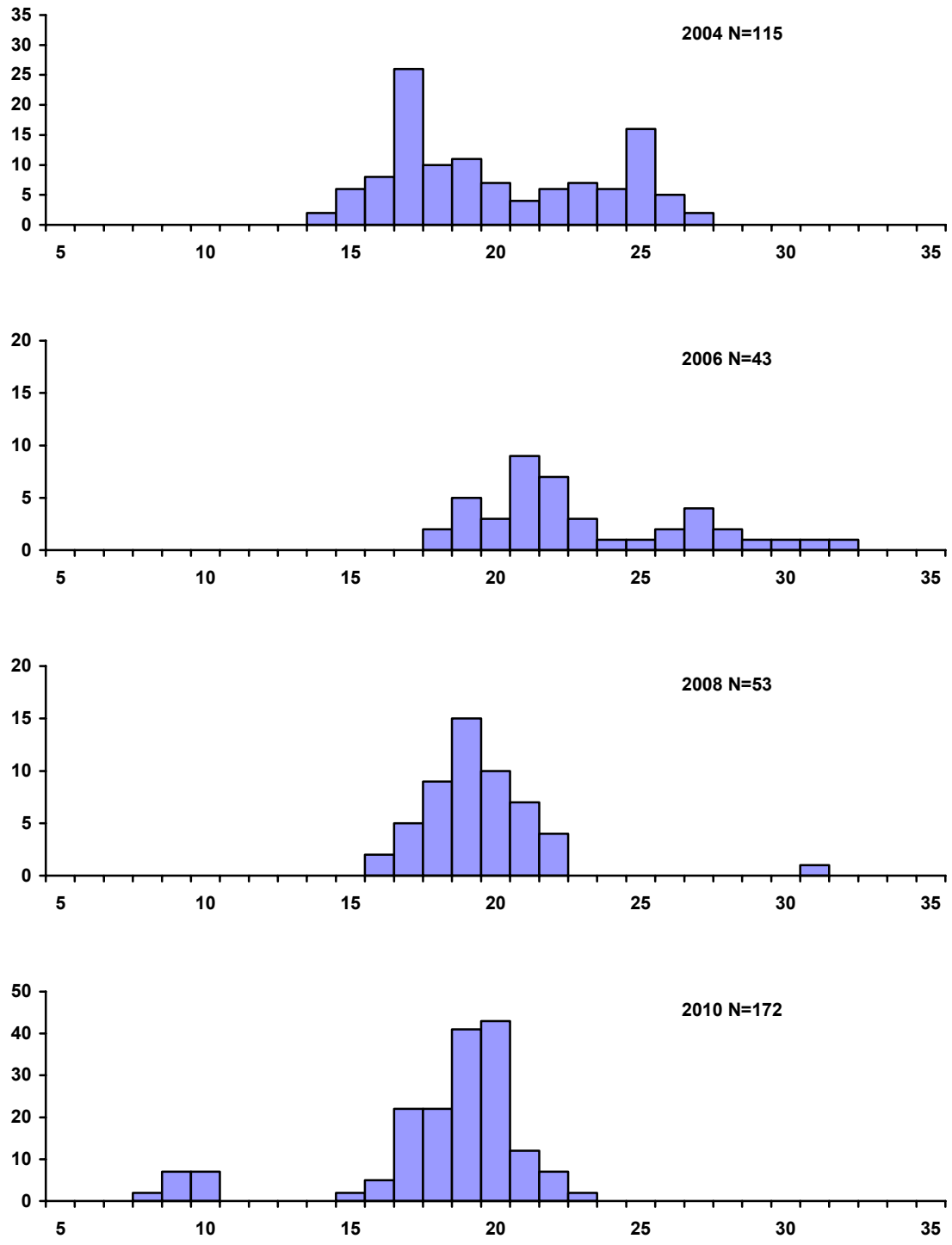

Figure 2. Length frequency histograms for yellow perch sampled with gill nets in East 81 Lake, Brookings County, 2004, 2006, 2008, and 2010.

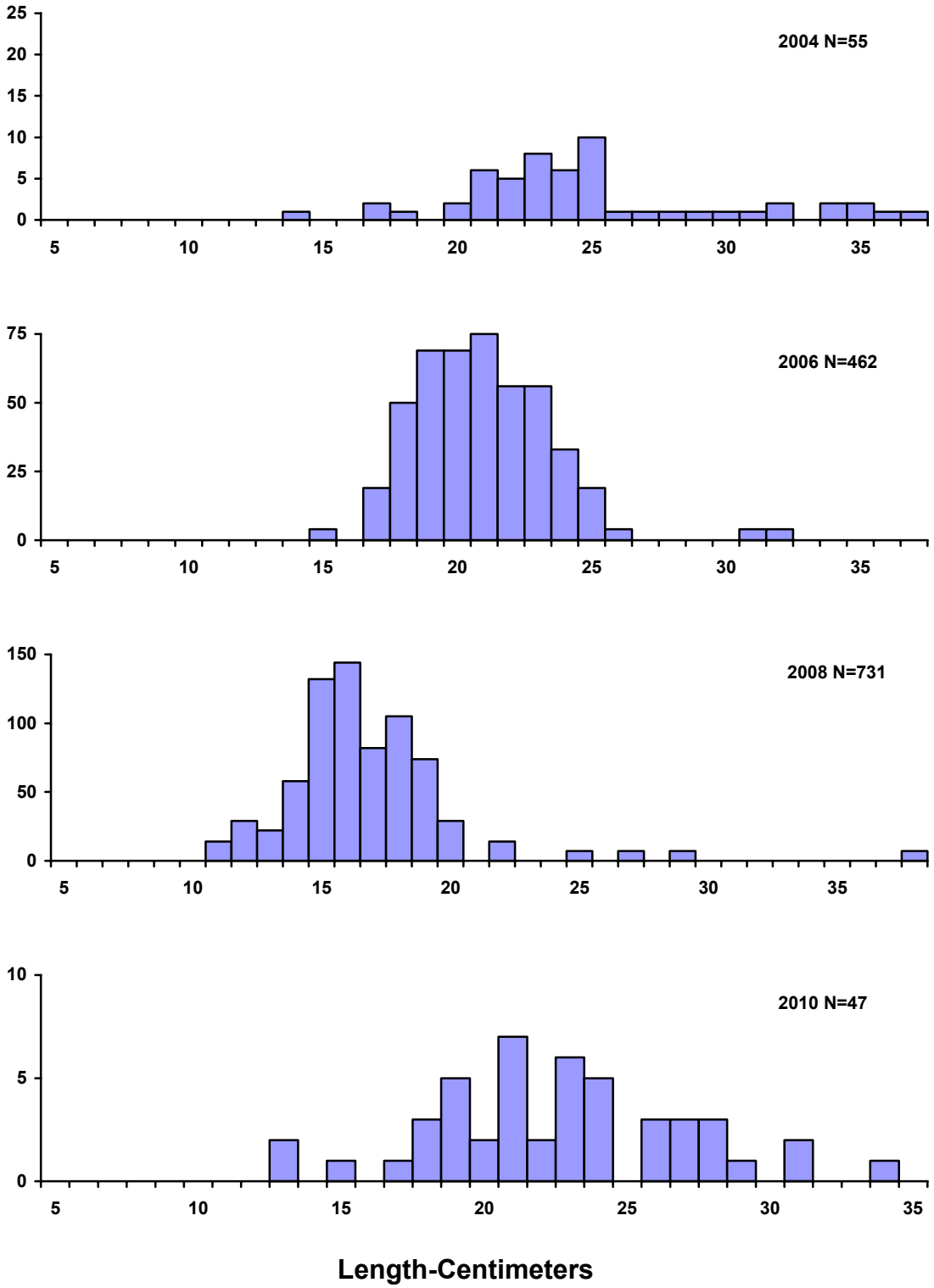

Figure 3. Length frequency histograms for black bullhead sampled with trap nets in East 81 Lake, Brookings County, 2004, 2006, 2008, 2010.

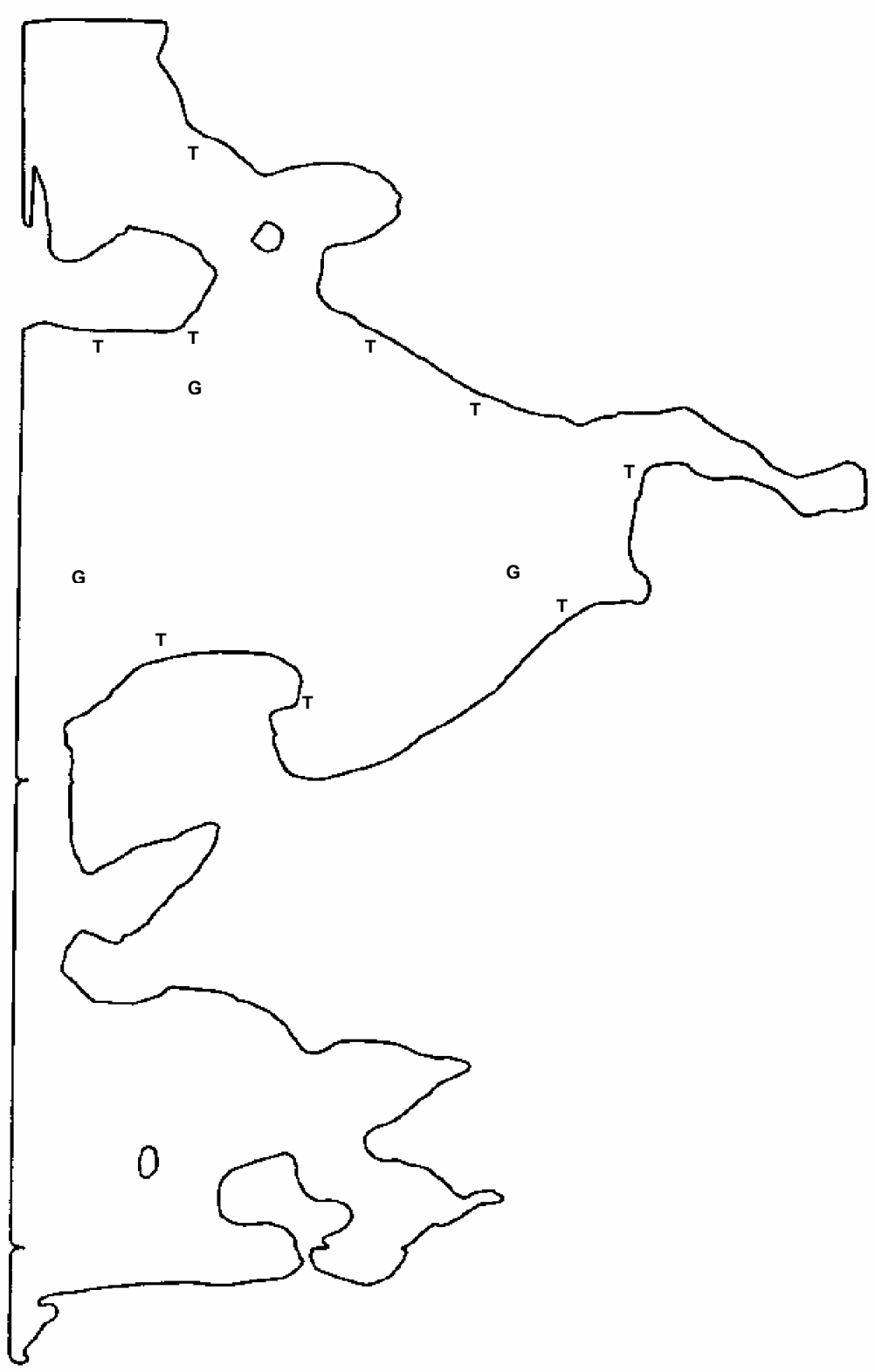

Figure 4. Sampling locations on East 81 Lake, 2010.

Appendix A. A brief explanation of catch per unit effort (CPUE), proportional stock density (PSD), relative stock density (RSD) and relative weight (Wr).

Catch Per Unit Effort (CPUE) is the catch of animals in numbers or in weight taken by a defined period of effort. Can refer to trap-net nights of effort, gill-net nights of effort, catch per hour of electrofishing, etc.

Proportional Stock Density (PSD) is calculated by the following formula:

$$PSD = \frac{\text{Number of fish} > \text{quality length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

Relative Stock Density (RSD-P) is calculated by the following formula:

$$RSD\text{-}P = \frac{\text{Number of fish} > \text{preferred length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

PSD and RSD-P are unitless and usually calculated to the nearest whole digit.

Size categories for selected species found in Region 3 lake surveys, in centimeters. (inches in parenthesis).

Species	Stock	Quality	Preferred	Memorable	Trophy
Walleye	25 (10)	38 (15)	51 (20)	63 (25)	76 (30)
Yellow perch	13 (5)	20 (8)	25 (10)	30 (12)	38 (15)
Black crappie	13 (5)	20 (8)	25(10)	30 (12)	38 (15)
White crappie	13 (5)	20 (8)	25(10)	30 (12)	38 (15)
Bluegill	8 (3)	15 (6)	20 (8)	25 (10)	30 (12)
Largemouth bass	20 (8)	30 (12)	38 (15)	51 (20)	63 (25)
Smallmouth bass	18 (7)	28 (11)	35(14)	43 (17)	51 (20)
Northern pike	35 (14)	53 (21)	71 (28)	86 (34)	112 (44)
Channel catfish	28 (11)	41 (16)	61 (24)	71 (28)	91 (36)
Black bullhead	15 (6)	23 (9)	30 (12)	38 (15)	46 (18)
Common carp	28 (11)	41 (16)	53 (21)	66 (26)	84 (33)
Bigmouth buffalo	28 (11)	41 (16)	53 (21)	66 (26)	84 (33)

For most fish, 30-60 or 40-70 are typical objective ranges for “balanced” populations. Values less than the objective range indicate a population dominated by small fish while values greater than the objective range indicate a population comprised mainly of large fish.

Relative weight (Wr) is a condition index that quantifies fish condition (i.e., how much does a fish weigh for its length). A Wr range of 90-100 is a typical objective for most fish species. When mean Wr values are well below 100 for a size group, problems may exist in food and feeding relationships. When mean Wr values are well above 100 for a size group, fish may not be making the best use of available prey.